WHAT IS CLAIMED IS:

1. An apparatus including an inductive-capacitive (LC) based quadrature voltage controlled oscillator (VCO) with a deterministic quadrature signal phase relationship, comprising:

first LC VCO circuitry including first differential VCO input terminals to receive a differential feedback signal having a signal wavelength and first differential VCO output terminals to convey a first differential VCO signal;

first phase shift circuitry including first differential phase shift input terminals directly coupled to said first differential VCO output terminals to receive said first differential VCO signal and first differential phase shift output terminals to convey a differential intermediate signal having said signal wavelength, wherein said first differential VCO signal and said differential intermediate signal differ in phase by a first phase difference less than a quarter of said signal wavelength with a predetermined polarity;

second LC VCO circuitry including second differential VCO input terminals directly coupled to said first differential phase shift output terminals to receive said differential intermediate signal and second differential VCO output terminals to convey a second differential VCO signal; and

second phase shift circuitry including second differential phase shift input terminals directly coupled to said second differential VCO output terminals to receive said second differential VCO signal and second differential phase shift output terminals cross coupled to said first differential VCO input terminals to convey said differential feedback signal, wherein said second differential VCO signal and said differential feedback signal differ in phase by a second phase difference less than said quarter of said signal wavelength with said predetermined polarity, and said differential intermediate signal and said differential feedback signal have mutually quadrature signal phases with a quadrature phase difference having said predetermined polarity.

2. The apparatus of claim 1, wherein said first and second phase differences are substantially equal.

3. The apparatus of claim 1, wherein:

responsive to reception of said differential feedback signal by said first LC VCO circuitry, said differential feedback signal and said first differential VCO signal differ in phase by a third phase difference less than said quarter of said signal wavelength with said predetermined polarity; and

responsive to reception of said differential intermediate signal by said second LC VCO circuitry, said differential intermediate signal and said second differential VCO signal differ in phase by a fourth phase difference less than said quarter of said signal wavelength with said predetermined polarity.

4. The apparatus of claim 1, wherein said differential intermediate signal leads said differential feedback signal in phase.

5. The apparatus of claim 1, wherein said differential intermediate signal lags said differential feedback signal in phase.

6. The apparatus of claim 1, wherein:

said first LC VCO circuitry comprises

first differential amplifier circuitry coupled between said first differential VCO input terminals and said first differential VCO output terminals, and

first resonator circuitry coupled to said first differential amplifier circuitry; and

said second LC VCO circuitry comprises

second differential amplifier circuitry coupled between said second differential VCO input terminals and said second differential VCO output terminals, and

second resonator circuitry coupled to said second differential amplifier circuitry.

7. The apparatus of claim 1, wherein said first and second phase shift circuitries comprise first and second phase lag circuitries, respectively.

8. The apparatus of claim 7, wherein said differential intermediate signal leads said differential feedback signal in phase.

9. The apparatus of claim 7, wherein:

said first phase lag circuitry comprises

first and second series resistances coupled directly between respective ones of said first differential phase shift input terminals and said first differential phase shift output terminals, and

a first shunt capacitance coupled between said first differential phase shift output terminals; and

said second phase lag circuitry comprises

third and fourth series resistances coupled directly between respective ones of said second differential phase shift input terminals and said second differential phase shift output terminals, and

a second shunt capacitance coupled between said second differential phase shift output terminals.

10. The apparatus of claim 1, wherein said first and second phase shift circuitries comprise first and second phase lead circuitries, respectively.

11. The apparatus of claim 10, wherein said differential intermediate signal lags said differential feedback signal in phase.

12. The apparatus of claim 10, wherein:

said first phase lead circuitry comprises

first and second series capacitances coupled directly between respective ones of said first differential phase shift input terminals and said first differential phase shift output terminals, and

a first shunt resistance coupled between said first differential phase shift output terminals; and

said second phase lead circuitry comprises

third and fourth series capacitances coupled directly between respective ones of said second differential phase shift input terminals and said second differential phase shift output terminals, and

a second shunt resistance coupled between said second differential phase shift output terminals.

13. An apparatus including an inductive-capacitive (LC) based quadrature voltage controlled oscillator (VCO) with a deterministic quadrature signal phase relationship, comprising:

first LC VCO means for receiving a differential feedback signal having a signal wavelength and in response thereto generating a first differential VCO signal;

first phase shifter means for directly receiving said first differential VCO signal and in response thereto generating a differential intermediate signal having said signal wavelength, wherein said first differential VCO signal and said differential intermediate signal differ in phase by a first phase difference less than a quarter of said signal wavelength with a predetermined polarity;

second LC VCO means for directly receiving said differential intermediate signal and in response thereto generating a second differential VCO signal; and

second phase shifter means for directly receiving said second differential VCO signal and in response thereto generating said differential feedback signal in a cross coupled manner, wherein said second differential VCO signal and said differential feedback signal differ in phase by a second phase difference less than said quarter of said signal wavelength with said predetermined polarity, and said differential intermediate signal and said differential feedback signal have mutually quadrature signal phases with a quadrature phase difference having said predetermined polarity.

14. A method for generating quadrature signals with a deterministic quadrature signal phase relationship, comprising:

receiving a differential feedback signal having a signal wavelength and in response thereto generating a first differential VCO signal;

directly receiving said first differential VCO signal and in response thereto generating a differential intermediate signal having said signal wavelength, wherein said first differential VCO signal and said differential intermediate signal differ in phase by a first phase difference less than a quarter of said signal wavelength with a predetermined polarity;

directly receiving said differential intermediate signal and in response thereto generating a second differential VCO signal; and

directly receiving said second differential VCO signal and in response thereto generating said differential feedback signal in a cross coupled manner, wherein said second differential VCO signal and said differential feedback signal differ in phase by a second phase difference less than said quarter of said signal wavelength with said predetermined polarity, and said differential intermediate signal and said differential feedback signal have mutually quadrature signal phases with a quadrature phase difference having said predetermined polarity.

15. The method of claim 14, wherein said first and second phase differences are substantially equal.

16. The method of claim 14, wherein:

said receiving a differential feedback signal having a signal wavelength and in response thereto generating a first differential VCO signal comprises generating said first differential VCO signal such that said differential feedback signal and said first differential VCO signal differ in phase by a third phase difference less than said quarter of said signal wavelength with said predetermined polarity; and

said directly receiving said differential intermediate signal and in response thereto generating a second differential VCO signal comprises generating said second differential VCO signal such that said differential intermediate signal and said second differential VCO signal differ in phase by a fourth phase difference less than said quarter of said signal wavelength with said predetermined polarity.

17. The method of claim 14, wherein said differential intermediate signal leads said differential feedback signal in phase.

18. The method of claim 14, wherein said differential intermediate signal lags said differential feedback signal in phase.

19. The method of claim 14, wherein:

said directly receiving said first differential VCO signal and in response thereto generating a differential intermediate signal having said signal wavelength comprises generating said differential intermediate signal such that said differential intermediate signal lags said first differential VCO signal in phase; and

said directly receiving said second differential VCO signal and in response thereto generating said differential feedback signal in a cross coupled manner comprises generating said differential feedback signal such that said differential feedback signal lags said second differential VCO signal in phase.

20. The method of claim 19, wherein said differential intermediate signal leads said differential feedback signal in phase.

21. The method of claim 14, wherein said

said directly receiving said first differential VCO signal and in response thereto generating a differential intermediate signal having said signal wavelength comprises generating said differential intermediate signal such that said differential intermediate signal leads said first differential VCO signal in phase; and

said directly receiving said second differential VCO signal and in response thereto generating said differential feedback signal in a cross coupled manner comprises generating said differential feedback signal such that said differential feedback signal leads said second differential VCO signal in phase.

22. The method of claim 21, wherein said differential intermediate signal lags said differential feedback signal in phase.